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Why and how FDI stocks are a biased measure of MNE affiliate activity

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Abstract

Many international business (IB) studies have used foreign direct investment (FDI) stocks to measure the aggregate value-adding activity of multinational enterprises (MNE) affiliates in host countries. We argue that FDI stocks are a biased measure of that activity, because the degree to which they overestimate or underestimate affiliate activity varies systematically with host-country characteristics. First, most FDI into countries that serve as tax havens generate no actual productive activity; thus FDI stocks in such countries overestimate affiliate activity. Second, FDI stocks do not include locally raised external funds, funds widely used in countries with well-developed financial markets or volatile exchange rates, resulting in an underestimation of affiliate activity in such countries. Finally, the extent to which FDI translates into affiliate activity increases with affiliate labor productivity, so in countries where labor is more productive, FDI stocks also result in an underestimation of affiliate activity. We test these hypotheses by first regressing affiliate value-added and affiliate sales on FDI stocks to calculate a country-specific mismatch, and then by regressing this mismatch on a host country's tax haven status, level of financial market development, exchange rate volatility, and affiliate labor productivity. All hypotheses are supported, implying that FDI stocks are a biased measure of MNE affiliate activity, and hence that the results of FDI-data-based studies of such activity need to be reconsidered.

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INTRODUCTION

Multinational enterprises (MNEs) are firms that own value-adding activities in more than one country, and are hence central to international business (IB). While many IB studies have examined the location and geographic distribution of such activities at the level of individual MNEs (e.g., Davidson, 1980; Henisz & Delios, 2001), a significant number of them have taken the value-adding activity performed by all MNE affiliates in a country as their level of analysis. Between them these studies have investigated:

- (1) how the foreign value-adding activities of MNEs from a given home country are distributed across host countries (e.g., Dunning, 1980, 1993; Dunning, Fujita, & Yakova, 2007);
- (2) how such cross-country distribution is affected by home and host-country characteristics (e.g., Buckley, Clegg, Cross, Liu, Voss, & Zheng, 2007; Grosse & Trevino, 1996; Habib & Zurawicki, 2002; Sethi, Guisinger, Phelan, & Berg, 2003); and

(3) how MNE affiliate activity affects various aspects of host-country development (e.g., Kwok & Tadesse, 2006; Li & Liu, 2005).

Most of these country-level studies have measured the total amount of value-adding activity performed by MNE affiliates in a host country by the aggregate stock of foreign direct investment (FDI) in that country, and changes in such activity by aggregate FDI inflows. Presumably they have done so because there are readily available home-to-host FDI stock and flow data, whereas home-to-host data on actual value-adding activity by MNE affiliates are available only for a few developed home countries.¹ For instance, in his often-cited book *Multinational enterprise and the global economy*, Dunning relies heavily on FDI stocks and flows to study “the extent and pattern of the global activities of MNEs” (1993: 14). In a later study (Dunning et al., 2007), he and his colleagues use such FDI data to investigate Rugman and Verbeke’s (2004) finding that most MNEs concentrate their value-adding activities in their home region. Likewise, Brouthers, Gao, and McNicol (2008) measure increases in market-seeking and resource-exploiting activities of MNE affiliates in a host country by FDI flows to that country in market-seeking and resource-exploiting industries.²

Although many studies have relied on them, FDI stocks do not adequately measure the value-adding activity of MNE affiliates in a host country, nor do FDI flows accurately measure changes in such activity. What FDI stocks and flows do capture is the net financial capital that MNE parents have provided to their host-country-based affiliates, and the retained earnings of these affiliates, and that capital need not be used to generate value-adding MNE affiliate activity. As Fujita, the Chief of the Investment Trends Section at UNCTAD that publishes FDI data, writes:

It should be emphasized that FDI is a BoP [Balance of Payments] concept used to measure cross-border financial flows. It does not measure the true extent or use of investment (in buildings, land, machinery, equipment) by foreign investors ... Indeed, while the concepts and definitions of BoP and FDI should be consistent with international standards ... they offer limited guidance regarding the real economic role played by foreign affiliates in a host economy. (Fujita, 2007: 4)

While it is true that a few other scholars have also acknowledged that FDI stocks are a noisy measure of the amount of value-adding MNE affiliate activity in host countries (Dunning & Lundan,

2008; Lipsey, 2007), we argue that the problem is more severe than that, because there are several factors that, far from just adding noise, tend to *bias* FDI stocks as a measure of total MNE affiliate activity. First, not all FDI into a host country is used to generate affiliate value-added there. As some scholars have acknowledged (Lipsey, 2007), tax havens, in particular, receive huge FDI inflows and have large inward FDI stocks, but these flows and stocks do not generate value-adding MNE affiliate activity there. We therefore hypothesize that FDI stocks *overestimate* actual MNE affiliate activity in tax havens relative to non tax-havens. Second, in addition to FDI there are other factors that contribute to value-adding MNE affiliate activity. Specifically, FDI figures include only the equity and loans that originate from MNE parents and the retained earnings of affiliates: thus they do not include the substantial volume of funds raised by MNEs from external host-country sources. Indeed, the extent to which MNE affiliate activity is financed with such locally raised external funds is likely to be greater in host countries with larger stock and bond markets, a more competitive banking sector, lower interest rates, and a more volatile exchange rate. This leads us to hypothesize that FDI stocks *underestimate* actual MNE affiliate activity to a greater extent in such countries. Moreover, FDI is a financial input, and hence does not capture how productively it will be used by MNE affiliates to generate output. We would expect the productivity of the factors of production that may be purchased with this financial input, especially labor, to vary systematically across host countries, with a given amount of FDI generating more value-added in countries where employees of MNE affiliates are more productive. The extent to which inward FDI stocks *underestimate* affiliate value-added should therefore also be greater in countries that have more productive MNE affiliates.

To test these hypotheses, we first regress the aggregate value-added and sales of US foreign affiliates in a specific country and year on the US FDI stock in that country and year. The regression coefficients thus obtained indicate how much the FDI stock for each host-country-year combination over- or underestimates affiliate value-added and sales. We then regress these coefficients on the tax haven status of a host country, the size of its stock and bond markets, the competitiveness of its banking sector, its prevailing interest rate, its exchange rate volatility, and the labor productivity of the MNE affiliates that it hosts. In line with our

hypotheses, we find that FDI stocks overestimate actual MNE affiliate activity to a greater extent in countries that are tax havens, and underestimate it to a greater extent in countries with more developed capital markets, more volatile exchange rates, and higher affiliate labor productivity. Thus, we find that the mismatch between FDI stocks and actual MNE affiliate activity is host-country-specific, meaning that FDI stocks are a biased measure of such activity.

These findings make it clear that it is risky to infer differences in MNE affiliate activity across countries based on differences in their inward FDI stocks, because the cross-country distribution of inward FDI stocks gives a biased picture of how actual MNE value-adding activity is distributed across host countries. Our findings also show that prior studies that have used country-level FDI data to identify the determinants and consequences of host-country MNE affiliate activity have used a biased dependent and independent variable, respectively, and hence may have obtained biased results. Hence they suggest that, to gain more insight into the distribution, determinants, and consequences of country-level MNE affiliate activity, we should rely less on FDI data and more on affiliate value-added and sales data.

WHAT DOES FDI REALLY MEASURE?

FDI is part of the capital account of a country's balance of payments, which records its financial transactions with other countries. FDI is universally defined as

an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor (FDI enterprise or affiliate enterprise or foreign affiliate). FDI implies that the investor exerts a significant degree of influence on the management of the enterprise resident in the other economy. Such investment involves both the initial transaction between the two entities and all subsequent transactions between them and among foreign affiliates, both incorporated and unincorporated. (UNCTAD, 2006: 293; also see IMF, 1993; OECD, 1996)

FDI flows are cross-border flows of financial capital that usually measure the difference between the funds that MNE parents provided to their foreign affiliates and the funds that foreign affiliates provided to their parents in a given year (UNCTAD, 2006). They have three components: equity capital transactions, reinvested earnings, and intra-company debt transactions. Equity

capital transactions are purchases and sales by parents of the shares of enterprises registered in foreign countries. Reinvested earnings comprise the parent's part of its foreign affiliates' earnings that are neither distributed as dividends by affiliates nor remitted to their parent, but instead are retained and reinvested.³ Finally, intra-company debt transactions are short- and long-term borrowing and lending of funds between parents and affiliates (IMF, 1993; OECD, 1996; UNCTAD, 2006). FDI stocks are accumulated FDI flows, and hence measure the value of an affiliate's shares and reserves (including its retained earnings) attributable to the parent, plus the net indebtedness of the affiliate to the parent (UNCTAD, 2006; US Bureau of Economic Analysis, 2004).

Figure 1 shows two reasons why FDI figures may misrepresent actual MNE affiliate activity, and the two types of resulting mismatches. First, as shown in Figure 1a, FDI figures ignore the fact that inward FDI does not necessarily generate inward MNE affiliate activity. When this is in fact the case, there will be a mismatch between a country's inward FDI figure and its actual inward MNE affiliate activity. Specifically, the FDI figure will overestimate actual inward MNE affiliate activity, and will thus require a negative correction ($-X$) to accurately reflect that activity. Second, as shown in Figure 1b, FDI figures ignore the fact that other factors besides FDI funds may also contribute to value-adding MNE affiliate activity. In this case there will also be a mismatch between the inward FDI figure of a country and its actual inward MNE affiliate activity, with the FDI figure now underestimating that activity, and hence requiring a positive correction ($+Y$) to properly reflect it.

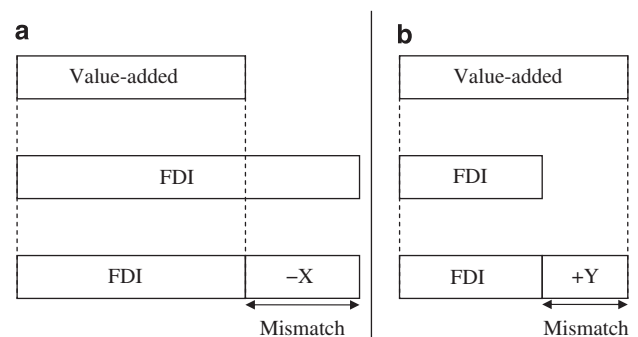


Figure 1 Reasons why FDI figures may misrepresent value-adding MNE affiliate activity, and resulting mismatches. (a) Part of FDI (X) not used to generate affiliate value-added. (b) Omitted determinants (Y) of affiliate value-added.

DETERMINANTS OF THE MISMATCH BETWEEN FDI STOCKS AND ACTUAL MNE AFFILIATE ACTIVITY

As we have argued in the previous section, FDI figures may overestimate or underestimate the true amount of value-adding MNE affiliate activity. The question is whether the extent of this overestimation or underestimation is random, or whether it varies systematically across host countries depending on their characteristics. Below we develop hypotheses on the main host-country characteristics that are likely to influence that overestimation or underestimation. Our hypotheses focus on the inward FDI stocks of countries rather than on their FDI inflows, as FDI stocks supposedly reflect total inward MNE affiliate activity, whereas FDI inflows are meant to reflect changes in activity.

Tax Haven Status

Consider again the possibility outlined in Figure 1a: inward FDI does not necessarily generate value-adding MNE affiliate activity in the focal host country. This is especially likely to be the case with tax haven countries, for two tax-related reasons. First, as interest payments are tax deductible, MNE parents or affiliates located in high-tax countries can reduce their tax bill by sending funds to their own holding companies located in tax havens and then from there lending the funds back to themselves (Hines & Rice, 1994).⁴ Second, MNEs can locate financial and intangible assets in a tax haven to avoid paying tax on them (Lipsey, 2007). In both cases inward FDI does not generate value-adding MNE affiliate activity in the tax haven country: thus inward FDI stocks overestimate that activity. The overestimation is likely to be less severe or absent in non-tax-haven countries, where tax-driven inward FDI is less likely to occur.

Hypothesis 1: The extent to which inward FDI stocks overestimate actual MNE affiliate activity will be greater when the host country is a tax haven.

Locally Raised External Funds

As Figure 1b shows, a second problem with measuring value-adding MNE affiliate activity by FDI stocks is that such activity depends not only on the amount of FDI but also on other factors. One such factor is the equity and debt that MNE affiliates can obtain from sources within the host country (Cantwell, 1992; Borensztein, De Gregorio,

& Lee, 1998). Such locally raised external funds are not included in FDI stock and flow data (Kogut & Chang, 1991; Root, 1994), yet the extent to which MNE affiliates are financed with locally raised external equity and debt is substantial, and varies across host countries. Such funds account for 39.6% of the total financing of US majority-owned affiliates in developed countries, and for only 30% in developing countries (Lehmann, Sayek, & Kang, 2004).

Which host-country characteristics determine the extent to which the value-adding activities performed by MNE affiliates will be financed with locally raised external funds rather than with FDI funds? For one, the level of development of local financial markets. All else equal, the larger and more competitive these markets, the lower the cost of obtaining local funds from external sources, and hence the greater the incentive for MNE affiliates to finance their activity with locally raised equity or debt (Aulakh & Mudambi, 2005; Rajan & Zingales, 1998; Shleifer & Vishny, 1997). Hence we hypothesize that:

Hypothesis 2: The extent to which inward FDI stocks underestimate actual MNE affiliate activity in a country will be greater when the host country's financial markets are more developed.

Considerable exchange rate volatility may also induce market-seeking MNEs to finance a greater part of the value-adding activities of their local affiliates with locally raised external funds, because such funds, unlike FDI funds, are recorded in the same currency as the locally generated revenues of these affiliates, thus reducing exchange rate risks (Caves, 1998; Shapiro, 2003).⁵ Hence the greater the volatility of a country's exchange rate, the more the inward FDI stock of that country is likely to underestimate its actual inward MNE affiliate activity. In other words:

Hypothesis 3: The extent to which inward FDI stocks underestimate actual MNE affiliate activity in a country will be greater when that country's exchange rate is more volatile.

Affiliate Labor Productivity

In addition to locally raised external funds, another determinant of MNE affiliate activity that causes FDI stocks to underestimate such activity is the average labor productivity of foreign MNE affiliates. That productivity varies systematically across host countries due to cross-country differences:



(1) in the industries in which foreign MNE affiliates are active; and (2) in affiliate labor productivity within a given industry (Braconier, Norback, & Urba, 2005; Yeaple, 2009). MNE affiliates in some countries may be active in high-technology industries where labor productivity is relatively high, whereas in others they may focus on low-tech, low labor productivity activities. Affiliate labor productivity may also vary across countries within a given industry as a result of cross-country differences in managerial skills, local technology, and plant and equipment availability (De Backer & Sleuwagen, 2005). Everything else being equal, the higher the average labor productivity of foreign MNE affiliates in a country, the more a given unit of FDI stock in that country will translate into actual MNE affiliate activity, and hence the greater the extent to which the country's inward FDI stock will underestimate such activity. In other words:

Hypothesis 4: The extent to which inward FDI stocks underestimate actual MNE affiliate activity in a country will be greater when the average labor productivity of MNE affiliates in that country is higher.

METHODOLOGY

Data and Sample

To measure the extent to which FDI stocks in a country overestimate or underestimate its value-adding MNE affiliate activity, we need both FDI stock data and data on value-adding MNE affiliate activity. The Bureau of Economic Analysis (BEA) of the US Department of Commerce publishes a database entitled *US direct investment abroad: Financial and operating data*, which contains aggregated financial and operating data on US MNE affiliates located in a large number of host countries.⁶ From this database we took two measures of the value-adding activity performed by US MNE affiliates in a host country: total affiliate value-added, and total affiliate sales. Affiliate sales are annually available for all non-bank affiliates of non-bank US parents since 1983, and affiliate value-added is annually available for majority-owned non-bank affiliates of non-bank US parents since 1994.⁷ Affiliate value-added

measures the contributions of foreign affiliates to the gross domestic product (GDP) of foreign countries. ... [It] can be measured as gross output (sales or receipts and other operating income plus changes in inventories and work in progress) minus intermediate inputs (purchased goods and services). Alternatively, it can be measured as the sum of the costs incurred (except for intermediate inputs) and the

profits earned in production. The costs fall into four major categories: compensation of employees, net interest paid, indirect business taxes, and capital consumption allowance. (US Bureau of Economic Analysis, 2004: M-18/M-19)

The BEA uses the latter method to calculate affiliate value-added (Mataloni, 2007). According to Dunning, affiliate value-added is "the best indicator of the overall or sectoral economic significance of MNE activity" (1993: 7). It is a better indicator than affiliate sales, because the latter measures both a firm's own value-added and the value of inputs it purchases from external parties. In addition, value-added measures the value-added to an economy during a specific period, whereas some sales in a given period may represent production from earlier periods (US Bureau of Economic Analysis, 2004: M-19). Both affiliate value-added and sales were corrected for inflation using the annual GDP deflator reported in the *Penn World Tables* (Heston, Summers, & Aten, 2006).

We obtained the US FDI stocks in the countries for which value-added and sales data were available from the BEA database *US direct investment abroad: Balance of payments and direct investment position data*, where the stocks are valued at historical cost. In line with international definitions, the BEA defines historical cost-based US outward FDI stocks as

the net book value of US parents' equity in, and net outstanding loans to, their foreign affiliates. The position may be viewed as the US parents' contribution to the total assets of their foreign affiliates or as the financing provided in the form of equity or debt *by US parents* to their foreign affiliates. (US Bureau of Economic Analysis, 2004: M-22, italics added)

That is, "[f]inancing obtained from other sources, such as local or third-country borrowing, is excluded" (US Bureau of Economic Analysis, 2002: 26). Hence, the FDI stocks that we analyze indeed exclude the funds that US parents and their foreign affiliates obtain from external sources in the host country. Since our affiliate value-added and sales data are available only for non-bank affiliates of non-bank US parents, we subtracted from the total US FDI stock in each host country the US FDI stock in that country's banking industry. US FDI stocks in banking were also obtained from the *US direct investment abroad* database.

Since so many studies have used FDI stocks as a proxy for value-adding MNE affiliate activity, one would expect some systematic relationship between these stocks, on the one hand, and affiliate

Table 1 Year-averaged country-specific mismatches between FDI stocks and affiliate value-added and sales^a

<i>Host country</i>	<i>Mismatch based on value-added</i>	<i>Mismatch based on sales</i>	<i>Host country</i>	<i>Mismatch based on value-added</i>	<i>Mismatch based on sales</i>
<i>Panama</i>	0.553	0.761	<i>Venezuela</i>	0.776	0.874
<i>Guatemala</i>	0.558	0.668	Portugal	0.781	0.756
<i>Saudi Arabia</i>	0.577	0.896	<i>Switzerland</i>	0.794	0.993
<i>Ecuador</i>	0.586	0.719	<i>Nigeria</i>	0.799	0.631
<i>Trinidad and Tobago</i>	0.594	0.686	<i>Thailand</i>	0.803	0.869
<i>Costa Rica</i>	0.616	0.703	<i>Malaysia</i>	0.814	0.886
Luxembourg	0.631	0.716	Sweden	0.815	0.913
<i>Russia</i>	0.639	0.811	<i>Hong Kong</i>	0.823	0.943
<i>India</i>	0.666	0.741	<i>Argentina</i>	0.831	0.895
<i>Egypt</i>	0.681	0.771	<i>Indonesia</i>	0.831	0.875
<i>Barbados</i>	0.685	0.732	<i>Singapore</i>	0.837	0.970
<i>Peru</i>	0.689	0.769	Netherlands	0.837	0.984
Greece	0.703	0.736	Norway	0.859	0.901
Israel	0.715	0.781	Spain	0.861	0.963
Hungary	0.720	0.854	<i>Ireland</i>	0.870	0.907
Czech Republic	0.727	0.842	Mexico	0.875	0.985
<i>South Africa</i>	0.734	0.890	Belgium	0.888	0.992
Finland	0.740	0.598	<i>Brazil</i>	0.899	0.993
Turkey	0.742	0.796	Australia	0.902	0.999
New Zealand	0.745	0.843	Japan	0.920	1.056
<i>Chile</i>	0.747	0.789	Canada	0.925	1.042
<i>Philippines</i>	0.752	0.841	Italy	0.931	1.023
Poland	0.757	0.884	United Kingdom	0.936	1.026
<i>Colombia</i>	0.757	0.855	France	0.949	1.046
Denmark	0.776	0.862	Germany	0.977	1.074

^aOECD countries in bold. Tax havens in italics.

value-added and sales on the other. We first examined whether historical-cost-based FDI stock figures are roughly equal to inflation-corrected affiliate value-added and sales figures. However, for most of the host countries and years in our sample the FDI stock to value-added ratios and the FDI stock to sales ratios were not even close to 1. If FDI stocks were a reliable proxy for physical capital stocks, they should be approximately two to three times affiliate sales for the majority of country-year observations, since macroeconomic studies show the capital-output ratio to be roughly in that range (Kaldor, 1961; Timmer & van Ark, 2005). This was also not the case. In fact, FDI stock to sales ratios vary significantly in our sample, with the highest ratio being 13.03 for Panama in 1998 and the smallest 0.04 for Nigeria in 2001. FDI stock to value-added ratios show similar variation.

We supplemented our FDI stock, affiliate value-added, and affiliate sales data with data on our independent variables (obtained from several sources specified below), resulting in panel data for

50 host countries over a period of 11 years for affiliate value-added and 21 years for affiliate sales. The 50 host countries included in our sample are listed in Table 1, along with the year-averaged values of our dependent variables, which we discuss next.

Dependent Variables

We followed a two-stage procedure to test our hypotheses. In stage 1, we constructed two dependent variables. The first measures the country- and year-specific correction required to fix the mismatch between the US FDI stock and the value-added by US affiliates in a specific host country and year, while the second measures the correction required to fix the mismatch between US FDI stocks and US affiliate sales.

We obtained the first dependent variable by regressing the value-added by US affiliates in country i and year t on (1) a set of 50 (N) interaction terms between the US FDI stock in country i and year t and dummy variables for each country i , and (2) a set of 10 ($T-1$) interaction terms between

the US FDI stock in country i and year t , and dummy variables for the years from 1995 to 2004, using 1994 as the reference year. Formally:

$$\begin{aligned} & \text{Log value} - \text{added}_{it} \\ &= \beta_i(\log \text{FDI}_{it})(\text{dummy for country } i) \\ &+ \beta_t(\log \text{FDI}_{it})(\text{dummy for year } t + 1) + \varepsilon_{it} \end{aligned} \quad (1)$$

Because both the affiliate value-added and FDI stocks data were skewed, we log transformed them to obtain a normal distribution. The additional advantage of estimating Eq. (1) in logs is that our coefficients become elasticities, and can be interpreted as percentage changes. That is, we empirically estimate the extent to which an $x\%$ change in FDI translates in a $y\%$ change in value-added. The 50 β_i 's in Eq. (1) measure the *host-country-specific* relationships between FDI and value-added in the reference year 1994. The 10 β_t 's measure the extent to which these relationships change in each of the remaining years from 1995 to 2004 compared with this reference year.

We then construct our second-stage dependent variable as $\beta_i + \beta_t = \beta_{it}$, reflecting the country- and year-specific percentage increase in value-added that results from an $x\%$ increase in the FDI stock in host country i and year t (compared with the reference year 1994). Because locally raised external funds and affiliate labor productivity also contribute to affiliate value-added, but are omitted from Eq. (1), the β_{it} 's suffer from an omitted variables bias. In our case, this bias causes the β_{it} 's to become higher than their "true" values (Cameron & Trivedi, 2005; Wooldridge, 2002). In terms of Figure 1b, the estimated β_{it} 's incorporate both the actual impact of FDI on value-added, as well as the upward correction (+Y) induced by the presence of omitted variables also affecting value-added. Hence, the higher the extent to which locally raised external funds and affiliate labor productivity contribute to affiliate value-added in a given country and year (i.e., the higher the degree of underestimation of actual MNE affiliate activity), the higher the β_{it} for that country-year combination. Inversely, tax havens tend to combine relatively high FDI stocks with low levels of affiliate value-added in Eq. (1), causing the β_{it} 's to become smaller than their "true" values. In terms of Figure 1a, the estimated β_{it} 's now incorporate both the actual impact of FDI on value-added and the downward correction (−X) induced by the disproportionate amount of FDI into the host country.

Hence countries that are tax havens in year t (i.e., countries whose inward FDI stocks overestimate actual inward MNE affiliate activity) receive relatively low β_{it} values.⁸

We followed a similar approach to construct a second dependent variable reflecting the relative mismatch between US FDI stocks and US foreign affiliate sales for each host-country-year combination. Since the affiliate sales data were available for the period 1983–2004, we included 21 ($T-1$) rather than 10 interactions between FDI stocks and year dummies in the second regression equation. The correlation between our two dependent variables in the sample is 0.79.

For a few host countries and years, the BEA reports data on the current liabilities and long-term debt of majority-owned non-bank affiliates of non-bank US parents to persons resident in the country where the affiliate is located. The log of this rough indicator of the extent to which US MNEs rely on locally raised external funds correlates at 0.86 with our logged measure of the mismatch between FDI stocks and affiliate value-added, and at 0.82 with our logged measure of the mismatch between FDI stocks and affiliate sales. Although these correlations pertain only to the exclusion of locally raised external debt from FDI stocks, they do suggest that both of our dependent variables are reasonably accurate proxies for the mismatch between FDI stocks and actual MNE affiliate activity.

Table 1 reports the year-averaged scores of both dependent variables for all 50 host countries, ranked according to the year-averaged size of the mismatch between FDI and value-added. As stated earlier, countries in which locally raised external funds and affiliate labor productivity contribute relatively more to MNE affiliate activity should receive relatively high scores on both mismatch variables. This is indeed the case, as OECD countries with relatively well-developed local capital markets and relatively productive affiliate labor generally receive higher scores on both dependent variables than non-OECD countries. Tax havens, on the other hand, are expected to have relatively low scores on both mismatch measures compared with non-tax havens. This expectation is only partly supported by the scores reported in Table 1. Although Panama as a tax haven indeed has the lowest score on the value-added-based mismatch measure, several other countries listed as tax havens, such as Ireland, have relatively high scores on both mismatch measures,

presumably because they also have relatively well-developed capital markets and productive affiliate labor.

Independent Variables

In stage 2 of our estimation procedure we regressed our two dependent variables on the following independent ones:

Tax haven. This dummy variable was coded 1 for host countries listed as tax havens by Hines and Rice (1994). Their list has also been used by Dharmapala and Hines (2009), who state that it has been remarkably stable over time.

Level of development of local financial markets. We used four variables as proxies for the level of development of the financial markets in each host country:

- (1) the size of its stock market;
- (2) the size of its debt market;
- (3) the level of competition in its banking sector; and
- (4) its interest rate.

In line with studies in financial economics (Levine & Zervos, 1998; Rajan & Zingales, 1998), we measure the size of a host country's stock market by the ratio of the total value of the shares traded on that market to the country's GDP as reported in Beck, Demirgüç-Kunt, and Levine's (2001) database. Similarly, we measure the size of a host country's bond market by the ratio of private credit by deposit money banks and other financial institutions to its GDP (Levine & Zervos, 1998) as reported in Beck et al.'s (2001) database. Following prior research on banking (for a review, see Degryse & Ongena, 2007), we measure the level of competition in a country's banking sector by 1 minus its Herfindahl index of bank concentration. This index (H) is equal to the sum of the squared market shares of all banks active in a given country. Formally:

$$\text{Competition} = 1 - H, \text{ where } H = \sum_{i=1}^n s_i^2 \quad (2)$$

where s_i is the market share of bank i , and n is the total number of banks in a country. An index of 0 indicates that the banking sector of country is a monopoly, whereas values near 1 indicate close to perfect competition (Tirole, 1988). The Herfindahl indices were obtained from the Beck et al. (2001) database. Finally, we enter the annual long-run (i.e., 10-year) interest rate of each host country

(Grosse & Trevino, 1996; Olibe & Crumbley, 1997) as reported in IMF's *International financial statistics*. We reverse-coded the interest rates in our regression models, so that higher values of this variable indicate that locally raised external debt is less costly.

Exchange-rate volatility. In line with Campa (1993) and Globerman and Shapiro (2003), we measure the volatility of a host country's currency/US\$ exchange rate by the log of the percentage deviation of this rate from its past 3-year average. The source for the annual exchange rates is *Penn World Tables* (Heston et al., 2006).

Affiliate labor productivity. Since labor productivity is highly correlated with wage rates (Braconier et al., 2005), we measure the average labor productivity of US foreign affiliates in a host country by the average wage rate of employees of these affiliates. Following Loree and Guisinger (1995) and Slangen and Beugelsdijk (2010), that average wage was obtained by dividing the total annual employee compensation expenses of US majority-owned affiliates in a country by their total number of employees. Both the compensation expenses and employment figures were obtained from the BEA database *US direct investment abroad: Financial and operating data*.

Method

Modified Wald chi-squared tests for heteroskedasticity in panel datasets indicated that both the first-stage regression models that we ran to generate our value-added and sales-based mismatch measures and the second-stage models in which we regressed these measures on our key independent variables contained within-panel heteroskedasticity ($p < 0.05$). Moreover, Wooldridge's (2002) test for autocorrelation in panel datasets indicated that both these sets of models also contained first-order autocorrelation ($p < 0.05$). We therefore estimate them using FGLS regression analysis, as this statistical method enables us to correct the standard errors of the regression coefficients for both heteroskedasticity and autocorrelation. Because our second-stage dependent variables (i.e., our two mismatch measures) are themselves estimated parameters, we use their inverse standard errors as weights in our second-stage regressions in order to avoid biases in our second-stage regression coefficients (Saxonhouse, 1976). This implies that estimated

parameters with larger standard errors receive lower weights.

RESULTS

We report in Table 2 the descriptive statistics of all second-stage variables and their correlations. The correlation between stock and bond market size is 0.63, indicating that countries with larger stock markets also have larger bond markets. The size of both is negatively correlated with local interest rates ($r=-0.48$ and $r=-0.68$ respectively), suggesting that countries with a larger stock or bond market have lower interest rates. To check whether our regression results reported below suffer from multicollinearity, we inspected the condition indices of our regression models. All condition indices were lower than 15, indicating that multicollinearity is not a concern (Belsley, Kuh, & Welsch, 1980).

We show in Table 3 the results of the regression analyses that we ran to test our hypotheses. Model 1 shows the effects of our independent variables on the mismatch between FDI stocks and affiliate value-added, and Model 2 shows the effects of these variables on the mismatch between FDI stocks and affiliate sales. Recall that a negative regression coefficient for a variable implies that a downward correction is required to correct for the mismatch, and hence that the variable affects the extent to which FDI stocks *overestimate* actual MNE affiliate activity (cf. Figure 1a). Inversely, a positive regression coefficient for a variable implies that an upward correction is needed (owing to the omitted variables bias), and hence that the variable affects the extent to which FDI stocks *underestimate* actual value-adding MNE affiliate activity (cf. Figure 1b). Hypothesis 1, stating that FDI stocks overestimate actual MNE affiliate activity in tax havens relative

to non tax-havens, is supported, as the coefficient of the tax haven dummy is significantly negative in both models. Hypothesis 2 states that FDI stocks will underestimate actual MNE affiliate activity more in countries with more developed financial markets. This hypothesis is also supported, as all four of our proxies for local financial market development, that is, stock market and bond market size, bank competition, and the reverse-coded interest rate, are significantly positive in both models. Hypothesis 3, proposing that FDI stocks underestimate MNE affiliate activity more in countries with more volatile exchange rates, receives support as well, since the impact of exchange rate volatility is significantly positive in both models. Finally, Hypothesis 4 predicts that the extent to which FDI stocks underestimate actual MNE affiliate activity is greater for countries where affiliate employees are more productive, as indicated by their higher average wage rate. This hypothesis is also supported, as the regression coefficient of our proxy for affiliate labor productivity is significantly positive in both models. In sum, we find strong support for all four of our hypotheses.

Sensitivity Analyses

To assess the robustness of the above results, we performed several follow-up analyses. Table 4 summarizes the outcomes of these analyses. First, we add country fixed-effects to our second-stage regression models to exclude the possibility that the impact of our independent variables on the mismatch between FDI stocks and actual affiliate activity is driven by omitted country-specific factors correlated with our independent variables. Because the tax haven dummy is time-invariant, it drops out of our fixed-effects specifications.

Table 2 Descriptive statistics and correlations ($N=565$)

	Mean	S.D.	1	2	3	4	5	6	7	8
1. Mismatch between FDI stocks and affiliate value-added ^a	0.78	0.11	1							
2. Mismatch between FDI stocks and affiliate sales ^a	0.91	0.11	0.79	1						
3. Tax haven	0.14	0.35	-0.11	0.02	1					
4. Stock market size ^a	-2.12	1.82	0.51	0.57	0.05	1				
5. Bond market size ^a	-0.55	0.74	0.34	0.49	0.33	0.63	1			
6. Bank competition	0.36	0.20	0.06	0.01	-0.15	-0.26	-0.25	1		
7. Interest rate ^a	2.45	0.72	-0.34	-0.42	-0.30	-0.48	-0.68	-0.12	1	
8. Exchange rate volatility ^a	1.02	2.11	0.33	0.15	0.31	0.25	-0.05	0.08	0.14	1
9. Affiliate labor productivity ^a	3.17	0.68	0.46	0.49	0.14	0.41	0.46	0.27	-0.50	0.05

^aLogged to remove outliers and/or reduce skewness of raw variable.

Note: Pairwise correlations greater than or equal to |0.09| are significant at $p < 0.05$ (two-tailed).

Table 3 Country-specific determinants of the mismatch between US FDI stocks in countries and the value-added and sales by US affiliates in these countries^a

Independent variable	Expected sign	Model 1	Model 2
		Dependent variable: Mismatch between FDI stocks and affiliate value-added	Dependent variable: Mismatch between FDI stocks and affiliate sales
Tax haven	–	–0.037** (0.014)	–0.021* (0.009)
Stock market size	+	0.004*** (0.001)	0.005*** (0.001)
Bond market size	+	0.011*** (0.003)	0.019*** (0.003)
Bank competition	+	0.019** (0.007)	0.016* (0.007)
Interest rate ^b	+	0.016*** (0.002)	0.013*** (0.002)
Exchange rate volatility	+	0.001** (0.000)	0.001* (0.000)
Affiliate labor productivity	+	0.032*** (0.004)	0.038*** (0.003)
Intercept		0.767*** (0.016)	0.877*** (0.013)
<i>N</i>		452	565
Chi-squared		279.9***	504.3***
Log likelihood		1358.2	1607.9

^aStandard errors corrected for heteroskedasticity and first-order autocorrelation in parentheses. Inverse standard errors of second-stage dependent variables used as weights. (Saxonhouse, 1976)

^bReverse-coded.

[†] $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed tests).

Models 3a and 3b in Table 4 show that the inclusion of country fixed-effects does not substantially affect the effects of our other independents, the only noteworthy difference being that the effect of bond market size on our value-added-based mismatch measure becomes insignificant.

As noted above, and further discussed elsewhere (Bellak & Cantwell, 1996; Cantwell & Bellak, 1998), the BEA reports US FDI stocks at historical cost (i.e., at the costs at the time an investment was made) rather than at current cost (i.e., at their value today). Consequently, reported US FDI stocks in developed countries, where the bulk of US FDI was made relatively long ago, may be artificially low compared with those in developing countries, where most US FDI is more recent, potentially causing the underestimation of actual MNE affiliate activity by FDI stocks to be greater in developed than in developing countries. On the other hand, the share of joint ventures (JVs) among US affiliates is greater in developing than in developed countries. Because the value-added and sales of US

foreign affiliates are not adjusted for the US parent's ownership share in the affiliate (US Bureau of Economic Analysis, 2004: M-18), whereas the part of US FDI stocks that stems from equity capital purchases by US parents is, US FDI stocks in developing countries may underestimate MNE affiliate activity more than those in developed countries.⁹ For these two opposing reasons, a country's economic development level may be correlated with our mismatch measures. At the same time, it may also be correlated with some of our independent variables, such as a country's stock and bond market size, potentially causing their effects to be spurious. We therefore split our sample into developed (OECD) countries and developing (non-OECD) countries, thus creating two subsamples with less variation in host-country economic development levels. By and large the results of our subsample analyses, reported in Models 4a, 4b, 5a, and 5b in Table 4, are consistent with our earlier findings, although some variables lose their significance in some models, especially in the

Table 4 Sensitivity analyses^a

	<i>Dependent variable: mismatch between FDI stocks and affiliate value-added</i>				<i>Dependent variable: mismatch between FDI stocks and affiliate sales</i>			
	<i>Model 3a: Including country fixed effects</i>	<i>Model 4a: OECD countries only</i>	<i>Model 5a: Non-OECD countries only</i>	<i>Model 6a: Dependent variable based on Euclidean distance</i>	<i>Model 3b: Including country fixed effects</i>	<i>Model 4b: OECD countries only</i>	<i>Model 5b: Non-OECD countries only</i>	<i>Model 6b: Dependent variable based on Euclidean distance</i>
Tax haven		−0.090*** (0.021)	0.024 (0.019)	−0.626*** (0.124)		−0.056*** (0.016)	0.050** (0.014)	−0.617*** (0.128)
Stock market size	0.003*** (0.001)	0.007*** (0.002)	0.004** (0.001)	0.046*** (0.014)	0.004*** (0.001)	0.009*** (0.002)	0.004*** (0.001)	0.050*** (0.015)
Bond market size	0.004 (0.002)	0.017** (0.006)	−0.005 (0.006)	0.371*** (0.052)	0.008** (0.002)	0.013** (0.005)	0.013** (0.004)	0.382*** (0.055)
Bank competition	0.026*** (0.005)	0.022* (0.010)	0.036 [†] (0.020)	0.184 (0.123)	0.041*** (0.005)	0.028** (0.009)	0.030* (0.012)	0.187 (0.127)
Interest rate ^b	0.023*** (0.002)	0.009** (0.004)	0.015*** (0.004)	0.386*** (0.041)	0.018*** (0.002)	0.007* (0.003)	0.009** (0.003)	0.396*** (0.043)
Exchange rate volatility	0.001*** (0.000)	0.001* (0.001)	0.001 (0.001)	−0.015 [†] (0.008)	0.001* (0.000)	0.000 (0.001)	0.000 (0.001)	0.012 (0.008)
Affiliate labor productivity	0.020*** (0.003)	0.048*** (0.006)	0.014** (0.005)	0.960*** (0.045)	0.020*** (0.003)	0.043*** (0.006)	0.014** (0.004)	1.02*** (0.049)
Intercept	0.857*** (0.014)	0.724*** (0.028)	0.780*** (0.024)	1.07*** (0.196)	0.957*** (0.014)	0.887*** (0.025)	0.891*** (0.016)	1.08*** (0.212)
<i>N</i>	452	221	231	529	565	282	282	529
Chi-squared	42,913***	174.8***	40.4***	1517.5***	34,388***	212.2***	123.9***	1371.3***
Log likelihood	1494.9	689.4	714.6	−87.8	1900.7	753.0	841.6	−94.8

^aStandard errors corrected for heteroskedasticity and first-order autocorrelation in parentheses. Inverse standard errors of second-stage dependent variables used as weights in Models 3–5. (Saxonhouse, 1976)

^bReverse-coded.

[†]p<0.1; *p<0.05; **p<0.01; ***p<0.001 (two-tailed tests).

non-OECD subsample with the value-added-based mismatch measure (Model 5a). The most surprising result is that the effect of the tax haven dummy unexpectedly turns significantly positive in the non-OECD subsample with the sales-based mismatch measure (Model 5b).¹⁰ Because the effects of most variables are robust in sign and significance, (1) the valuation of US FDI stocks at historical rather than at current costs and (2) the lack of adjustment of affiliate value-added and sales for US parent ownership share do not seem to have affected the results of Table 3.

Finally, we used an alternative second-stage dependent variable, the Euclidean distance (ED), to measure the mismatch between FDI stocks and affiliate value-added and sales. For country i in year t that distance is given by

$$ED_{it} = \sqrt{(y_{it} - x_{it})^2} \quad (3)$$

where y_{it} is the US FDI stock in country i and year t , and x_{it} is the value-added and sales by US foreign affiliates in country i and year t , respectively. The correlation between these ED measures and our earlier regression-based dependent variables is 0.83 (for affiliate value-added) and 0.67 (for affiliate sales). As shown in Models 6a and 6b of Table 4, the effects of bank competition and exchange rate volatility are no longer significant when we use the two ED measures as dependent variables. The effects of all other independents, on the other hand, are robust in sign and significance, corroborating the reliability of our initial regression-based dependent variables.

DISCUSSION AND CONCLUSION

A substantial number of IB researchers have used the country as their level of analysis, investigating the cross-country distribution of MNE affiliate activity, the factors that determine the level of such activity, and its impact on host countries. With few exceptions, this macro-level literature has measured the aggregate amount of value-adding MNE affiliate activity in host countries by their inward FDI stocks. Although some authors have pointed out that such stocks are a noisy measure of total value-adding MNE affiliate activity (e.g., Dunning & Lundan, 2008; Lipsey, 2007), we argue and show that the problem is considerably more serious, in that the mismatch between FDI stocks and actual MNE affiliate activity is not random, but instead varies systematically across host

countries. We argue that the mismatch is due to two factors:

- (1) FDI into a country does not necessarily result in value-adding MNE affiliate activity there; and
- (2) locally raised external funds and affiliate labor productivity also contribute to value-adding MNE affiliate activity.

We hypothesize and show that the extent to which these factors result in a mismatch between FDI stocks and affiliate value-added and sales varies systematically across host countries, depending on their tax haven status, the size of their stock and bond markets, the level of competition in their banking sector, their interest rate, the volatility of their exchange rate, and the average labor productivity of the foreign MNE affiliates they host. In other words, we show that FDI stocks are a biased measure of actual MNE affiliate activity.

If anything, the average values of our value-added and sales-based mismatch measures are likely to be conservative estimates of the extent to which FDI stocks are a biased measure of foreign MNE affiliate activity, as we use the US as the home country in our study. The US has relatively large financial markets, making it relatively easy for US MNEs to obtain funds at home, thus giving them relatively few incentives to finance their value-adding activities in foreign countries with locally raised external funds. This suggests that the average mismatch is likely to be even greater for home countries with smaller financial markets than the US.

Before we derive the implications of our findings, we should first emphasize three limitations of our study. First, we have not developed a model that fully explains the mismatch between a country's inward FDI stock and its actual inward MNE affiliate activity. We focused on a coherent, yet limited, set of independent variables, because our main goal was to show the existence of a host-country-specific mismatch between FDI stocks and actual MNE affiliate activity, rather than to identify all possible predictors of the size of this mismatch. Future studies could examine whether country-level variables besides the ones we identified also influence the extent to which FDI stocks misrepresent actual MNE affiliate activity.

Second, because most studies measuring MNE affiliate activity by FDI stocks or flows have been at the country level, we have conducted our empirical tests at that level as well. However, industry-level factors may also influence the extent to which FDI data misrepresent actual MNE affiliate activity

(Rajan & Zingales, 1998). For instance, MNE affiliates in R&D-intensive industries may experience more difficulty in obtaining funds from local capital markets than their counterparts operating in low R&D industries, because local capital providers may be reluctant to finance sophisticated R&D projects that they find too difficult or costly to evaluate and monitor (Antras, Desai, & Foley, 2007). This kind of affiliate may be forced to turn to its parent for financing (Hennart, 1994). In such high-tech industries the mismatch between FDI stocks and affiliate value-added or sales may therefore be less than for low-tech industries. Future studies could incorporate these and other industry-level factors in their analyses.

Third, we have used the value-added and sales by US foreign affiliates as indicators of the actual amount of economic activity performed by these affiliates, but value-added and sales are not perfect measures of such activity either (Lipsey, 2007). For example, some affiliate sales in a given year may result from production, and hence economic activity, undertaken in earlier years (US Bureau of Economic Analysis, 2004: M-19). Moreover, MNEs sometimes artificially increase or decrease the sales and value-added generated by their foreign affiliates by manipulating the transfer prices they pay for inputs purchased from affiliates (Dunning, 1993; Eden, Juarez Valdez, & Li, 2005).

Despite these limitations, our findings have several important implications for country-level IB studies that use FDI data to examine the distribution, determinants, or host-country consequences of MNE affiliate activity. First of all, our findings suggest that studies that use FDI stocks to examine how such activity is distributed across host countries may reach erroneous conclusions. The fact that the stock of FDI in country or region X is twice as large as that in country or region Y does not necessarily mean that MNE affiliate activity in country or region X is twice as large as that in country or region Y, because, as our analyses show, the extent to which FDI stocks accurately reflect MNE affiliate activity varies systematically across countries. It may be that foreign MNEs finance the majority of their value-adding activities in country X with FDI funds obtained from their parents, and the majority of their activities in country Y with external funds obtained from local financial markets. Consequently, while the inward FDI stock of country X may be twice as large as that of country Y, MNE affiliate activity in country Y may in fact be equally large as, or even greater than,

that in country X. Similarly, a downward trend in a country's FDI stocks does not necessarily indicate that the country is becoming a less attractive production or sales location for foreign MNEs. Such a trend may also indicate that the host country's financial markets are improving, leading foreign MNEs to turn to these markets for a larger proportion of the funding of the activities of their local affiliates.

To examine the implications of our findings for FDI-data-based studies of the determinants of MNE affiliate activity, we regressed our two mismatch measures on some of these determinants.¹¹ We found that geographic distance, economic size, and level of economic development are significantly positively related to both mismatches ($p < 0.01$), whereas cultural distance is significantly negatively related to them ($p < 0.001$). These findings suggest that the reported effects of these variables in FDI-data-based regressions may be biased. For instance, like the negative effect of the tax haven dummy shown in Table 3, the negative effect of cultural distance on both mismatches suggests that FDI stocks overestimate actual MNE affiliate activity to a greater extent in culturally more distant host countries. Combined with the fact that cultural distance usually has a negative effect on MNE affiliate activity (Slangen & Beugelsdijk, 2010), this suggests that studies measuring such activity by FDI stocks may have underestimated that effect. This may explain why some authors who have measured MNE affiliate activity by FDI data have found that cultural distance is non-significant in some of their models (Loree & Guisinger, 1995; Sethi et al., 2003). Similarly, it can be shown that the effects of economic size and level of economic development in FDI-data-based studies may have been underestimated, and that the effect of geographic distance may have been overestimated.

A similar reasoning applies to studies that have proxied MNE affiliate activity by FDI stocks or flows to examine how such activity influences various aspects of host-country development. We found that at least one of their dependent variables, per capita GDP growth, is significantly positively related to our value-added and sales-based mismatch measures (at $p < 0.001$ and $p < 0.1$, respectively), indicating that the extent to which inward FDI stocks underestimate actual inward MNE affiliate activity is greater for host countries with higher growth rates. Since FDI figures underestimate MNE affiliate activity more in countries with higher growth rates, and since such activity may

normally be expected to have a positive effect on host-country growth (Beugelsdijk, Smeets, & Zwinkels, 2008), studies using FDI data may have underestimated that effect.

To conclude, IB research is interested in the value-adding activities of firms outside their own country. The magnitude of these activities is ideally measured by the value-added generated by these firms abroad, and reasonably approximated by their foreign affiliate sales. While FDI flows and stocks are perfectly appropriate measures of a country's inflows and outflows of financial capital, and of their cumulative size, they are not simply noisy but are biased measures of the magnitude of the value-adding activities performed by MNEs abroad. A number of scholars, including Hejazi (2007), Rangan (1998), and Slangen and Beugelsdijk (2010), have shown that it is possible to use other measures of the aggregate value-adding activity performed by MNE affiliates in host countries to ascertain its magnitude, determinants, or impact on host countries. We believe the time has come for others in the IB field to follow their lead.

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NOTES

¹This possibility was suggested to us by the editor.

²In total we found 44 studies of the cross-country distribution, country-level determinants, and host-country consequences of MNE affiliate activity that have measured that activity by FDI stocks and its change by FDI flows. A list of these studies is available from us upon request.

³Hence the term "FDI" is somewhat misleading, because reinvested affiliate earnings do not involve a cross-border transfer of capital (Root, 1994). Note that FDI figures for some countries, such as Denmark,

France, Japan, Spain, Singapore and Thailand, exclude reinvested earnings.

⁴UNCTAD (2006: 12) estimates that from 25% up to 50% of all FDI into China is undertaken by Chinese firms that are sending back to China funds initially sent from there to the Virgin Islands and other tax havens.

⁵As pointed out by an anonymous referee, this option is available only to affiliates with revenues in the host market. This was indeed the case for most US foreign affiliates, with about 65% of their sales over the 1983–2004 period being local (Beugelsdijk, Pedersen, & Petersen, 2009; Lehmann et al., 2004).

⁶The BEA defines a US foreign affiliate as "a foreign business enterprise in which there is US direct investment; that is, it is a foreign business enterprise that is directly or indirectly owned or controlled by one US person to the extent of 10% or more of the voting securities for an incorporated business enterprise or an equivalent interest for an unincorporated business enterprise" (US Bureau of Economic Analysis, 2004: M5-M6).

⁷The fact that affiliate value-added is available only for non-bank affiliates in which non-bank US parents have a majority ownership stake should not pose serious problems. Data from the 1999 *US direct investment abroad* benchmark survey show that majority-owned non-bank affiliates of non-bank US parents account for 85.0% of the sales of all non-bank affiliates of non-bank US parents (US Bureau of Economic Analysis, 2004: M-29, Table 7). The percentages for total assets and employment are 87.6% and 84.2%, respectively, suggesting that the percentage for value-added is likely to be in the same range.

⁸A formal econometric presentation of these arguments is available from the authors upon request.

⁹We thank an anonymous reviewer for bringing this point to our attention.

¹⁰This unexpected effect is driven by the inclusion of Hong Kong and Singapore in the non-OECD subsample. Both of these countries are well-known tax havens, and at the same time have relatively high scores on our sales-based mismatch measure (see Table 1). When we excluded these two countries from the non-OECD subsample, we obtained the expected significantly negative coefficient of the tax haven dummy on the sales-based mismatch measure.

¹¹In the interests of space, we do not report here the results of these regressions or the measurement details of these determinants. They are available from us upon request.



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